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I. Introduction: Science and the Human Condition

The essential method of modern science is analysis. Reductionism and incrementalism have given us deep insight into the nature of matter and energy, at least. We have built a techno-industrial society structured mainly so as to maximize the power of these understandings in order to give us leverage in our age-old struggle with nature. Thus, some would conjecture that at long last we may be at that point where there can truly be a "human use of human beings." But only the most extreme optimist would hold that such an outcome is as yet more than a vision.

The fact is that, in this decade of the 1960s, we may trace the locus of another exponential curve in man's experiences. To a large degree it is a curve which measures a countervailing inclination in man's nature. It measures man's desire to synthesize, to find meaning and purpose, from man's point of view.

This drive, in and of itself, is not new. It is of the essence of religion. Much of philosophy concerns man's search for holistic concepts which will help him see a meaningful pattern in the complexity with which his perceptual world confronts him. What is new is the rapidly growing intensity of the quest, and the modern context of the search. Plato's Republic is from a world quite different from that of Boguslaw's The New Utopians.

The essence of modern science has recently been epitomized as follows:

1. Science is constantly, systematically and inexorably revisionary. It is a self-correcting process and one that is self-destroying of its own errors. . .

2. A related trait of science is its destruction of idols, destruction of the gods men live by. . . Science has no absolute right or absolute justice. . . To live comfortably with science it is necessary to live with a dynamically changing system of concepts. . .it has a way of weakening old and respected bonds. . .

3. Not only are the tenets of science constantly subject to challenge and revision, but its prophets are under challenge too. . .

4. Further, the findings of science have an embarrassing way of turning out to be relevant to the customs and to the civil laws of men--requiring these customs and laws also to be revised. . .

5. Certainly we have seen spectacular changes in the concept of private property and of national borders as we have moved into the space age. . .

6. Moreover, the pace of technological advance gravely threatens the bountiful and restorative power of nature to resist modification. . .

7. Another trait of science that leads to much hostility or misunderstanding by the nonscientist is the fact that science is practiced by a small elite. . .(which) has cultural patterns discernibly different from those of the rest of society. . .

8. The trait that to me seems the most socially important about science, however, is that it is a major source of man's discontent with the status quo. . .[1]

Examination of the essence of this list of characteristics of modern science gives us a basis for appreciating Norbert Wiener's closing words in his assessment of the "Moral and Technical Consequences of Automation" made only a decade ago:

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[1] Walter Orr Roberts, "Science, A Wellspring of Our Discontent," American Scholar, Summer, 1967, pp. 252-58.

> ...we can still by no means always justify the naive assumption that the faster we rush ahead to employ the new powers for action which are opened up to us, the better it will be. We must always exert the full strength of our imagination to examine where the full use of our new modalities may lead us.[2]

Delineations of the highly exponential rate of change in the growth and application of human knowledge abound. Examples from many fields are readily at hand. That we live in an era of quantum jumps in science and technology seems patent and uncontestable, at least measured by any yardstick provided by man's experience to date. Yet our full appreciation of the magnitude of what is happening to us is only slowly dawning. As one astute observer wrote a few years ago:

> Within a decade or two it will be generally understood that the main challenge to U.S. society will turn not around the production of goods, but around the difficulties and opportunities involved in a world of accelerating change and ever-widening choices. Change has always been part of the human condition. What is different now is the pace of change, and the prospect that it will come faster and faster, affecting every part of life, including personal values, morality, and religion, which seem most remote from technology. . . So swift is the acceleration, that trying to "make sense" of change will come to be our basic industry.[3]

And the urgency of contemporary circumstances have been well expressed only a few weeks ago by a biologist, who feels that:

> . . .now the empirical evidence may be turning to support those who feel that science is in some sense in the grip of natural forces which it does not command. . .
>
> I am not really sure that we stand on the kind of watershed Luther stood on when he nailed his theses to the

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[2] Science, May 6, 1960, reprinted in Morris Philipson, Automation: Implications for the Future (N.Y.: Vintage Books, Random House, 1962), p. 173.

[3] Max Ways, "The Era of Radical Change," Fortune, May, 1964, p. 113.

> door of the cathedral, but we may make a serious mistake if we do not at least entertain that possibility. If we fail to recognize the average man's need to believe that he has some reasonable command over his own life, he is simply going to give up supporting those systematic elements in society which he sees as depriving him of this ability.[4]

This paper is concerned with man in organizations. The major hypothesis explored is that managers of large enterprises--public or private, in any context--have an increasingly urgent socio-humanistic responsibility to create self-actualizing organizations which will assure to the maximum extent possible the transcendence of human over technological values. The major thesis is that general systems insights, cybernetic science and computer technology can, so to speak, be "turned upon themselves" and made to provide the basis for achievements of this paramount requirement of contemporary managers.

II. Human Values and Non-Cybernetic Technologies

Concern for the impact of technology upon human values is hardly a recent phenomenon. With varying degrees of explicitness since Karl Marx at least, many have sought to call man's attention to the shift away from naturalistic values implicity required by machine civilization. As man was released from nature's grasp by his power-multiplying and labor-extending artifacts, he came under a new yoke: the man/machine interface had its own set of action priorities and behavior imperatives.

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[4] Robert S. Morison, "Science and Social Attitudes," Science, 11 July, 1969, p. 154.

But more than this, effective interaction with machines necessitated shifts in attitudes, changes in values. Nowhere was this more evident than in the workplace.

The utilization of steam power, for example, clearly implied the clustering of workers about factories. The accompanying value shift requirements have been noted, for example, by Elton Mayo, in his contrast of the "established" and the "adaptive" society. Clearly, the attitudinal skill most valued by modern industrial society is adaptiveness. Where the only constant is change, ready accomodation to change is a valued behavior. Mayo agreed with Janet that, in modern circumstances, for most of us, "sanity is an achievement." To keep one's emotional equilibrium is not easy among the shifting patterns in which most of us live.

But just at the time that man was called upon to contrive stability in increasingly dynamic environments, he was also required to find his place in increasingly large-scale and monolithic bureaucratic structures. An industrial artifacts evolved to more complicated forms and interrelated processes, a corresponding complex set of organizational modes was generated.

Thus, one strand of our concerns in this paper is with the impact of technologically-induced organizational complexes upon the attitudes and values of the humans who populate them. The other strand is concerned with the larger questions deriving from the impacts of technology upon man;s environment is general. The substance of our inquiry may perhaps be encapsulated by this question: "Are we now again pursuing a witless decision path where the sole parameter is 'What is possible technologically?' as we yesterday appeared only to ask the question 'Does it make sense economically?'"

It would not be sufficiently useful for purposes here to describe in detail the growing demand for articulation, for integration, for synthesis, for a more cosmic understanding of the socio-political implications of man's econo-technological behavior during the past century. But perhaps it is worth illustrating the point. Let us consider the now familiar example of the pollution of our physical environment.

In classical economic doctrine, air is a commonly-cited example of a "free" good. Economists are concerned only with the "optimally efficient allocation of economic resources," and "economic goods" are those which are in short supply, relative to demand.

But in recent times some of the most essential non-economic resources have rapidly moved out of that category. Concern for the magnitude and rate of pollution--environmental, social, and others--has intensified. Air, water, quiet, privacy: rather suddenly, these are decidely economic goods. We are finally beginning to comprehend the accumulation of enormous "hidden" costs of our econo-technological order, costs never reckoned in industrial or national accounts.

The dawning realization of the extent to which man has already fouled his nest brings us up short. Indeed, we fear that, in some compartments and in some respects, "spaceship earth" may already have been irremediably damaged. What price unbridled technological progress? Increasingly, the urgent need for holistic assessment of applied science is manifest. Only if we are sufficiently aware of full social ramifications will we be able to forestall the deleterious consequences of the "technological cornucopia" we have generated.

Thus, from society's standpoint, modern science and technology is Janus-faced: it has given us wealth in one sense, and poverty in another; it has harnessed nature to man's basic needs in ways and to extents undreamed-of only a few decades ago, but it has fostered a continuingly lowered "quality of life." Today's massive environmental pollution problems are largely a consequence of the nearly unchallenged primacy of econo-industrial values. (And, to compound the felony, economic values were improperly costed, from a social system point of view, since implicit and opportunity costs of production were largely ignored.) Our essential concern grows from this historical trend. Will tomorrow's "human pollution" problems result from even more disastrous neglect of cybernetics applied to social constructs and human values? This is the haunting issue.

Some years ago the noted American educator Robert Maynard Hutchins opened an essay dealing with an assessment of the latent social impacts of cybernetion with the sanguine statement "I assume 1985 can be anything we want it to be." Is this any longer a tenable assumption? How is it to be reconciled with the conviction recently expressed by the nuclear physicist Amost DiShalit when he predicted that the time has come for us to recognize that the most man can hope for is parity with the merging "self-organizing" cybernetic computer complexes apparently an increasingly inherent part of our organizational life?[5]

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[5] Dialogue recorded at the Center for the Study of Democratic Institution, Santa Barbara, California, Tape #199 entitled "After Automation--What?"

III. General Systems Theory, Cybernetics, and the Methodologies of Modern Science

Before turning to the development of the argument, however, we must take note of another view expressed by Norbert Wiener which has caused some concern among those of us working for the development of organizational cybernetics. It may be recalled that in (one of his last works) God and Golem, Inc. Wiener concluded that he had

> . . . accomplished the task of showing many valid analogies between certain religious statements and the phenomena studies by cybernetics, and had gone reasonably far in showing how cybernetics ideas may be relevant to the moral problems of the individual.[6]

He rather tartly dismissed the idea that the social sciences could benefit by the application of cybernetics because, in his words, "cybernetics is nothing if it is not mathematical" and that he had "found mathematical sociology and mathematical economics or econometrics suffering under a misapprehension of what is the proper use of mathematics in the social sciences. . ." Wiener's major concern was that, in the social sciences, we have not appreciated how much mathematical physics rests upon the ability accurately and validly to measure the data with which it deals. And there is, for Wiener, an inherent difficulty, because, for example:

> . . . the economic game is a game where the rules are subject to important revisions, say, every ten years, and bears an uncomfortable resemblance to the Queen's croquet game in "Alice in Wonderland". . . .

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[6] Cambridge, Mass.: M.I.T. Press, March, 1966, p. 90. The volume is subtitled "A Comment on Certain Points where Cybernetics Impinges on Religion."

> Under the circumstances, it is hopeless to give too precise a measurement to the quantities occurring in it.[7]

We will not quibble that for Wiener not to have distinguished mathematical economics from econometrics may reveal his own lack of appreciation of the value of heuristic model building, as against inductive validation of mathematically deduced statements about nature. Be that as it may, we shall simply assert the social utility of speculatively considering the value impacts of "alternative futures," using concepts such as homeostasis, positive and negative feedback, isomorphic reasoning and morphogenic systems. We shall certainly not pretend that the social sciences have even yet much prospect of completely rigorous application of cybernetic science. But given the magnitude of and the urgency of the social need for fresh insights and imaginative outlook, general systems and cybernetic imagery such as found in the works of Kenneth Boulding, Anatol Rapoport, Ludwig von Bertalanffy and Stafford Beer are sorely needed. The identification of system ismorphies and the construction of homomorphic models is well worth whatever "pure science" rigor must be sacrificed when, in the words of Rapoport:

> Once this logic is grasped, the system approach to the study of man can be appreciated as an effort to restore meaning (in terms of intuitively grasped understanding of wholes) while adhering to the principles of disciplined generalizations and rigorous deduction. It is, in short, an attempt to make the study of man both scientific and meaningful.[8]

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[7] Ibid., p. 91.

[8] Foreword to Walter Buckley (ed.) Modern Systems Research for the Behavioral Scientist (Chicago, Ill.: Aldine Publishing Co., 1968) p. xxii.

IV. A Contrast of Paradigms: Non-Cybernetics Vis-A-Vis Cybernetic Organizations

Early in his book Cybernetics and Management Stafford Beer says: "It is inevitable that the word 'control' must be used frequently in the forthcoming discussions. I wish to state explicitly at this point that henceforth it will be used in a special sense: it will never denote the repressive and mandatory type of system which customarily passes for control. . . ."[9] The accompanying paradigm illustrates what Beer probably had in mind when he speaks of such a "repressive and mandatory" control system. It also serves to bring into our focus our concern for human values as affected by organizational processes. Let us interpret the (clockwise) progression on Schematic I. (p. 11).

At the outset, we assume the existence of more or less clearly stated organizational objectives, for we are dealing here with purposive organizations. On the basis of the application of the "principles of organization and management" as usually delineated in traditional texts, management thinks in terms of the logics of heirarchical authority structure and of rational modes of departmentation of the jobs to be done, as the organization is designed. Efficiency, coordination logics, "span of control" considerations: these are the by-words in terms of which organization charts are usually drawn.

But, unfortunately for such an approach, people are required to do the jobs, and eventually specific names have to be written in the boxes on the chart. But just here, at this early stage in design, is where the usual approach begins to fail to take important parameters into

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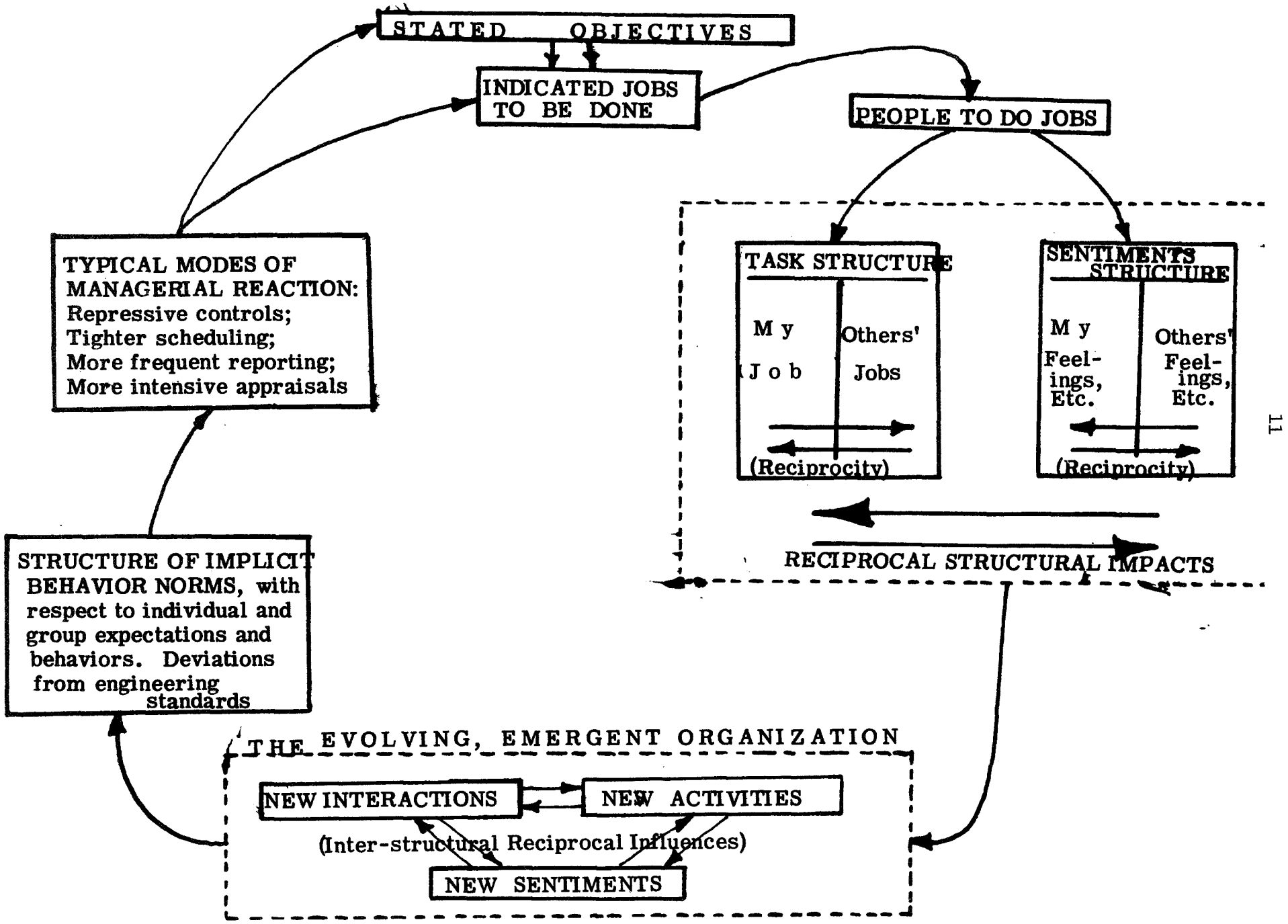
[9] N.Y.: John Wiley & Sons, Inc., (Science Editions), 1959.

SCHEMATIC I: A "REALITY ANALYSIS" OF ORGANIZATIONAL BEHAVIOR PROCESSES



account, for managements usually attend to only the "task" subsystem of the total system with which they should in reality be dealing. That is, management understands the necessity of organizational design which integrates each task into the total work flow; principles such as "scalar chain" are applied to assure, on paper at least, that each job will contribute to the organization's ultimate purposes. But historically it has only recently come to appreciate the other major subsystem with which it should deal: that of "sentiments," to use F. J. Roethlisberger's characterization. The argument is simply this: the effectiveness with which an organization functions is determined at least as much by who holds the positions which are delineated on the organization chart, as by the cleverness of the organization structure which defines and abstractly inter-relates the "jobs to be done." Thus, the assumptions, feelings, perceptions, values, etc. which comprise the "personalities" of the specific people involved in the operation must somehow be taken into account, if a systemic organizational model is to be achieved. And this is all the more so since, as the exhibit indicates, there is not only reciprocal influence exerted within each of the subsystems, but between the subsystems themselves as well.

Thus the dynamics of organizations-in-action should be viewed as an evolving social system, with management attention focused on the continually emergent system resulting from the reciprocal influences exerted by new activities (jobs), interactions (relationships), and sentiments (values)--to use Homans' terminology. Now because historically management simply did not have the communication and control

tools adequately to deal with such emergent phenomenon on a "real time" basis, we usually find that a subtle and intricate set of "implicit behavior norms" comprise the real essence of the actual control mechanism operative in large-scale organizations. That is, something is usually needed in order to "make the organization work" and to fill the behavior interstices left by the formalized statement of the system found in such paraphernalia as organization charts manuals of operating procedure and the like. Organizational cement is therefore manufactured by organizational participants within the framework of the inadequate formal control system specified. This cement comprises the behavior norms which are based upon the "evolving pattern of expectations" which organizational role-players develop. A sub rosa dynamic control system arises, most often in terms of the tacit pattern of agreements which evolves among interacting organizational participants, reflecting their needs and values, as well as the organization's.

Now when management belatedly becomes awares that, for example, engineering standards are habitually not being met in work outputs, the usual reaction is for the activation of formal authority and control mechanisms. Unsatisfactory performance evaluations more often than not seem to lead directly to the imposition of explicit, formal, manifest control mechanisms. And, as subsequent events all too often show, such delayed and proscriptive reactions either merely trigger a search for new modes of behavior which will put management off for another period of time, or to a divergent cycling and organizational explosion which we usually refer to as a "positive feedback" phenomenon.

If things deteriorate sufficiently--and they usually do--the cycle depicted on the accompanying schematic is usually completed by someone in management concluding that "it's time we reorganize." Indeed, a favorite bureaucratic pathology seems to be "If in doubt, reorganize," either in terms of restructuring positions, or reshuffling people, or both. It is hypothesized here, however, that an index of managerial quality is to be found in the frequency with which managers have to resort to the instruments of formal control: the more the need for using explicit sanctions, the greater the likelihood is that the manager(s) in question do not adequately understand the nature of the problem(s) with which they seek to deal. The cliché "Having lost sight of our objectives, we redouble our efforts" reflects this over-anxious and erroneous managerial reaction. As the chart indicates, the fact may be that what really needs to be called into question is the organizations' stated objectives.

Here then is a telescoped image of a behavior cycle which led Chris Argyris over a decade ago to the conclusion that "there is a lack of congruency between the needs of healthy individuals and the demands of formal organization."[10] What is the alternative?

Perhaps the most important single characteristic of modern organizational cybernetics is this: That in addition to concern with the deleterious impacts of rigidly-imposed notions of what constitutes

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[10]Argyris first made this statement in "The Individual and Organization: Some Problems of Mutual Adjustment," Administrative Science Quarterly, June, 1957, p. 9. (See also his book Personality and Organization).

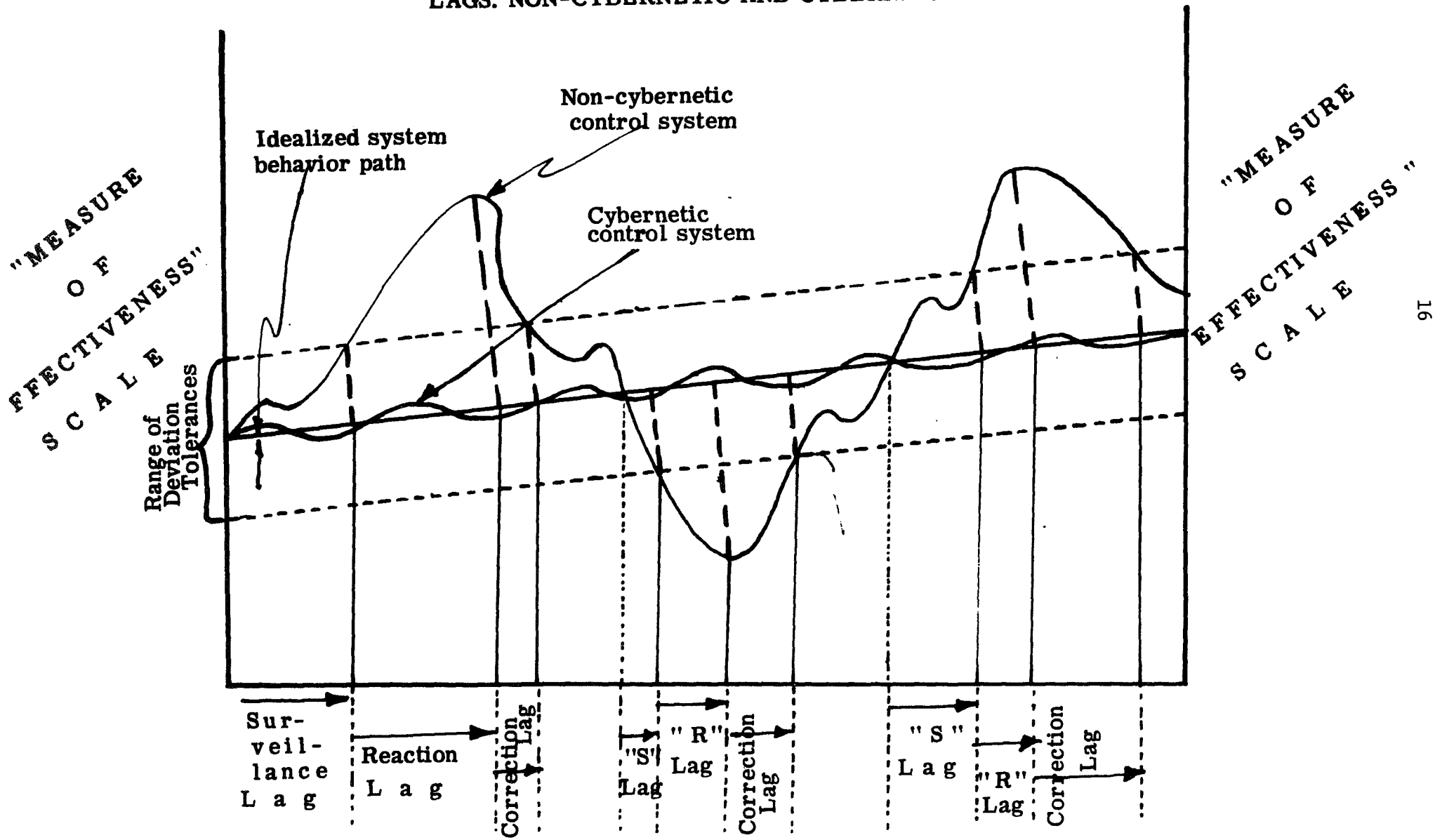
the application of good "principles of organization and management," the organization is viewed as a subsystem of larger system(s), and as comprised itself of functionally interdependent subsystems. Thus, the so-called "human relations movement" of the past quarter-century or so concentrates upon analysis of the internal dynamics of organizational life. The "fusion process" is its focus: out of the individual's attempt to personalize the organization, and the organization's efforts to socialize the individual, comes an amalgam which hopefully enables each concurrently to fulfill its needs.

But at best, feedback in organizational concepts such as those delineated above depends upon a very high order of managerial perceptual sensitivity and interpersonal communications clarity. Even where such managers are to be found, in large scale organizations the permutations and combinations of interaction dynamics soon exceed human channel capacities. Thus, it is only as we have moved into the world of general systems theory, cybernetic science and computer technology have the on-line, real-time loops been adequately closed. Perhaps this can best be illustrated by considering how organizational cybernetics has the potential for substantially eliminating three kinds of communication and control lags usually found in management information systems.

Schematic II. (p. 16) indicates that, as the non-cybernetic organization pursues its goals along a chosen behavior path, from time to time the output indicators signal that the behavior tolerances have been violated. This requires positive managerial action to bring the output within prescribed limits.

S C H E M A T I C II

COMPARISON OF SURVEILLANCE, REACTION AND CORRECTION LAGS: NON-CYBERNETIC AND CYBERNETIC CONTROLS



But we see that correction usually occurs only some time after the limits have been exceeded, and then only with a time lag.

Analytically, what we see is that three kinds of lags are identifiable: the "surveillance" lag, the "reaction" lag, and the "correction" lag. By the first is meant simply that, more often than not days or weeks or months pass between the occurrence of an actual deviation, and its report to management: this is the surveillance lag. But even after managers are aware of the need to do something, and actually set about corrective action, organizational inertia must be overcome. The firm may tend to persist for some time as it has been heading, before the redirection brakes take hold: this is the reaction lag. Finally, the correction lag occurs between the time the system begins to exhibit a reversal of inertia, and return to a path within the range of tolerance.

Now of course the slightly deviant behavior path which oscillates about the "ideal" path represents the situation after realization of on-line, real-time reporting and control capability. It may be noted in passing that, as the Forrester industrial dynamics model has shown,[11] immediately corrective and completely remedial managerial actions which will always instantaneously return organizational behavior to the idealized path are usually not desirable. Optimal lags often exist, as complex organizational subsystems interact.

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[11] See Jay W. Forrester, "Industrial Dynamics: A Major Breakthrough for Decision Makers," Harvard Business Review, July/August, 1958, especially Exhibit X "Effect of Correction Time on Inventories," p. 49. This article (as in the case of Argyris above) preceeded Forrester's book Industrial Dynamics.

But here too, cybernetic approaches to organizational design will help reveal what these are. This is no small point. It bears upon Beer's concern with the complementary fallacies _compositio_ and _divisio_.[12] And since Beer has admirably presented the technical case for organizational cybernetics in both his _Cybernetics and Management_ and his more recent comprehensive volume _Decision and Control_,[13] I shall rest the argument at this point.

So we come at last to the essential question: How will all this promote the realization of human values?

V. Psychocybernetic Organizations, Human Needs and Social Values

Louis Fried has recently provided an imaginative utilization of Kurt Lewin's topological and vector psychology and the associated force-field theory to describe how the man/machine (psychocybernetic) system may be integrated with questions of perceptions and values in human organizations.[14] Suffice it to say that this kind of analysis represents

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12 See especially Stafford Beer "Below the Twilight Arch: A Mythology of Systems," _Yearbook of the Society for General Systems Research_, Volume, V (1960), p. 17.

13 N.Y.: John Wiley & Sons, Inc., 1966. The book's subtitle "The Meaning of Operational Research Management Cybernetics" gives a clue to its orientation.

14 "Psychocybernetics and the Organization," _Data Processing Magazine_, November, 1966, pp. 44-45.

substantion of the line of argument presented here, which may be summarized as follows: 1) really effective human organizations tend to be those which openly acknowledge usually implicit values, and assign them explicit priorities; 2) continuous discussion and modification of organizational values by participants will increase the likelihood of organization viability (homeostasis) and progress (heterostasis or morphogenesis); and 3) cybernetically-designed and managed organizations are not only most likely to realize their targeted levels of effectiveness, they also have greatest potential for fulfilling basic human needs and for realizing associated human values.

Let us be more specific in this linkage of human needs, social values, and organizational cybernetics. Clyde Kluckholn has defined a value as the "conception, explicit or implicit, distinctive of an individual or characteristic of a group, of the desirable which influences the selection from available modes, means, and ends of action."[15] Another anthropologist concludes that: 1) values differ, but all people have values; 2) values appear as parts of patterns of behavior developed in coping with specific sorts of life circumstances; 3) the concepts we develop to think about human life are shaped by values; 4) it is very difficult for us human beings to treat the solution of human problems as a technical matter. . .; and 5) even though the doctrine of "cultural relativity," as once put forward, has

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15 Quoted in R. Tagiuri "Value Orientations and the Relationship of Managers and Scientists," Administrative Science Quarterly, June, 1965, p. 40.

failed to withstand more sophisticated examination, it will never again be possible for us to think in terms of ethical absolutes in the same way that our nineteenth-century forebears did.[16]

But values, in turn, are functionally related to kinds and levels of perceived needs. Of course, needs too are culturally-determined in substantial measure--at least in the modes of their realization. But equally, it is possible to identify basic categories of human needs which transcend cultural contexts. Table I links six basic human needs to corresponding social values, frequently as expressed in modern industrial societies.[17] The table is constructed on the basis of the following putative assertion: cybernetically-controlled organizations will be more likely to respond to the indicated social values, and therefore will more ably identify and more effectively meet human needs.

Because cybernetically-oriented control systems give the organization far greater potential for articulation with larger systems of which they are a part (subsystem), the organization's values are likely to be highly responsive to those in the social environment. The cybernetic organization's value interpretations are also, reciprocally, very likely susbstantially to influence the general social values to an appreciably

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16 L. R. Peattie "Anthropology and the Search for Values," The Journal of Applied Behavioral Science, Volume 1, Number 4, 1965, pp. 371-2.

17 The six "basic human needs" and the corresponding definitions (columns one and two of Table I) are from J.B. Rotter, Social Learning and Clinical Psychology (N.Y.: Prentice-Hall, Inc., 1954).

TABLE I -14a- Organizational Cybernetics R. F. Ericson

TYPES OF ORGANIZATIONAL RESPONSE TO HUMAN NEEDS AND SOCIAL VALUES

CATEGORIES OF HUMAN NEEDS	CATEGORY DEFINITIONS	CORRESPONDING SOCIAL VALUES	TYPICAL MODES BY WHICH NONCYBERNETIC ORGANIZATIONS RESPOND (SATISFACTION MODES)	ILLUSTRATIVE ENHANCEMENT POTENTIALS IN CYBERNETIC ORGANIZATIONS
Recognition - Status	Need to be considered competent or good in a professional, social, occupational, or play activity. Need to gain social or vocational position--i.e., to be more skilled or better than others.	Opportunity	-Merit advancement -Award systems -Incentive programs -Overt commendations by superiors -Status symbols	-Expanded range of rational choice -Fewer organizational rigidities -Easier to identify individual merit -Objectification of performance appraisal criteria -More peer-group selections
Protection - Dependency	Need to have another person or group of people prevent frustration or punishment, or to provide for satisfaction of other needs.	Security	-Job tenure (employment security) -Group solidarity (implicit group behavior norms) -Unions and formal associations -Informal cliques -Dyads; "Buddy" systems	-Greater intra-organizational mobility -More feeling of "belonging" because of greater total communication, etc. -Greater openness; deeper awareness of mutuality
Dominance	Need to direct or control the actions of other people, including members of family and friends. To have any action taken which he suggests.	Progress	-Hierarchical leadership roles -"Father figures" translated into bureaucratic structures -Formal, legalistically legitimized role structures -"Superior/subordinate" chains; political maneuvering	-More leadership roles filled on basis of genuine merit -Greater dynamism, therefore greater opportunity for morphogenesis -Greater release of creativity because of more amorphous structures; -"ad hoc" and task-directed leadership
Independence	Need to make own decisions, to rely on oneself, together with the need to develop skills for obtaining satisfactions directly without the mediation of other people.	Freedom	-Pseudo-and quasi-democratic processes -Grievance procedures -"Corporate devil's advocates;" "Ombudsmen" -Staff roles; specialized expertise	-More chance to "do one's thing" in terms of organizational needs -Objectivity a norm: Release from bondage of unprovable assertions -Greater inter-organizational mobility -Freedom to innovate and be creative because technological change is a norm
Love and Affection	Need for acceptance and indication of liking by other individuals. In contrast to recognition-status, not concerned with social or professional positions of friends, but seeks their warm regard.	Participation	-Supportive and "human-centered" management -Rapport developed by after-hours activities, company-sponsored diversions, etc. -"Coffee Klatsch" groups -Confidants; mutual "back-scratching"	-Greater professionalism leads to greater mutuality and sharing -More ad hoc groups, formed on a voluntary (sociometric) basis -Greater inclination and opportunity to test consensus -More opportunity for spontaneous collaboration
Physical Comfort	Learned need for physical satisfaction that that has become associated with the gaining of security.	Environmental Quality	-Provision of work-conducive surroundings -Equipment support and services -Sensory protection -Ancillary reinforcements, e.g. provision of parking space, etc.	-Earlier, clearer and more focused evidence of dysfunctional circumstances -Greater chance for selectively providng for individual needs -More automation and robotizing of laborious tasks

larger extent than in the case of traditional non-cybernetically-managed entities. As I have elsewhere suggested, this cybernetically subsystem-system-suprasystem integration will tend to increase managerial value characteristics such as these: 1) moral sensitivity; 2) service motivation; 3) "extra-organizational" loyalties; 4) attitudes of tentativeness (tolerance); 5) democratic procedural orientations; 6) compassion; 7) search for "optimum instability" for the system; 8) rationality; and 9) greater self-actualization via "collegial" milieux.[18] The final column in Table I comprises items which are meant to be illustrative of the ways in which psychocybernetic organizations at least have potential for considerably enchancing the need-meeting, value-serving response modes typically found in traditionally-controlled organizations.

But we ascribe only the potential for greater value-realization. Various images of cybernetically-oriented organizations have, for many years now, been speculatively and suspiciously viewed as bringing about, with at least an equal degree of potentiality, quite the opposite result. So in conclusion, we address the question: What ground do we have for projecting the far greater likelihood that cybernetically-managed organizations will in fact bring about--sooner or later--a more "human use of human beings?"

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18 "The Impact of Cybernetic Information Technology on Management Value Systems" prepared for the XV International Meeting of The Institute of Management Sciences, (Cleveland, Ohio, September 12, 1968). To be published in the October, 1969 issue of Management Science, and in Volume XIV (1969) of the Society for General Systems Research Yearbook.

VI. Our Sociocybernetic World: Man's New Basis for Consanguinity

The essential premise of this paper has been that we do indeed live in an era of "historical discontinuity," and of "radical change," where guide-lines that have served man not too badly in the past have little relevance to present circumstances. Not that man has never before been thrust into eras which broke sharply with the past. Social revolutions and cultural cataclysms are an integral part of the human experience. But the present discontinuity is unique, for it is subtle, intangible and extremely complex in its manifestations. It has at once an "either/or" quality, an Armageddon and a Utopian feel to it.

Thus, man is no longer merely in a "game against nature." As never before, man is now in an "x-person" game, where the outcome is almost surely not of the zero-sum type. R. Buckminster Fuller's "World Game" is an imaginative expression of this viewpoint.[19] For these reasons there is, as never before, an urgent need to understand the forces at work, so as reasonably to assure their resolution in man's favor. More than this, the requirement is for man to control the generation of these science/technology vectors, in terms of socio-cultural hierarchies of values upon which consensuses have been reached. As the British historian E. H. Carr concluded several years ago:

> . . . progress in human affairs, whether in science or in history or in society, has come mainly through the bold readiness of human beings not to confine themselves to seeking

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19 Published in multilith as "World Game: How It Came About," April 21, 1968.

> piecemeal improvemnets in the way things are done, but to present fundamental challenges in the name of reason to the current way of doing things and to the avowed or hidden assumptions on which its rests.[20]

Recent interpretative works in the Unites States such as Ferkiss' Technological Man;[21] McHale's The Future of the Future;[22] and Boguslaw's The New Utopian;[23] speculations such as Kahn and Wiener's The Year 2000;[24] and the Daedalus volume Toward the Year 2000;[25] and institutionalizations of ideas such as are found in the recently-formed World Future Society and the Institute for the Future, have their counterparts in Europe and other parts of the world. They suggest that there are conjunctive forces in modern high-technology societies which are bringing into sharp focus the necessity for man to recognize that he now has the possibility of "creating his own future" as never before.

But even more discomfiting, in terms of old values and ancient premises, man is now meaningfully able to design his own future, not

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20 What is History, (N.Y.: Alfred Knopf, 1961), p. 207.

21 Victor C. Ferkiss, Technological Man: The Myth and the Reality New York: George Braziller, 1969)

22 John McHale, The Future of the Future. (N.Y. George Braziller, 1969)

23 Robert Boguslaw, The New Utopians: A Study of Systems Design and Social Change (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965)

24 Herman Kahn and Anthony J. Wiener, The Year 2000: A Framework for Speculation on the Next Thirty-Five Years (N.Y.: Macmillan, 1967).

25 Summer, 1967 issue.

just choose from nature's alternatives. Thus, in the words of a prominent solar astronomer:

> In our explosively changing world it is no longer sufficient to live with philosophies or religions simply handed down from an older generation. . . . Rather than simply fight for the preservation of the old things that are good, we must plan creatively also to shape the new. We must commit ourselves to dare to build the world we want, knowing that it is possible if we but demand it . . . [26]

We have presented the argument that cybernetically-controlled organizations, when we learn sufficiently well how to design and maintain them, have the potential for bringing about the kind of psychologically maturing "reciprocation" between organization and individual of which the managerial psychiatrist Harry Levinson has so ardently written.[27] Moreover, the application of cybernetics has potential for revolutionizing political processes, by providing for individualized responses to great questions arising in large-scale complex social systems. Within the past year, the British Minister of Technology has expressed the opinion that:

> Carried to its logical conclusion, this (cybernetically-inspired) process of decentralization could well provide a far greater role for the individual in the community than the 1984 pessimists about technology have ever realized. It is not only possible, but certain, that the evolution of modern management science will ultimately allow <u>every single individual</u> to be taken into full account in the evolution of social planning, taxation, and social security policy. Through a system which took account of the circumstances of each individual,

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[26] W.O. Roberts, <u>Op.Cit.</u>, p. 260.

[27] "Riciprocation: The Relationship between Man and Organization," <u>Administrative Science Quarterly</u>, March, 1965, p. 370 ff.

> governments could get a feedback so comprehensive as to allow policy to be really personalized . . . . Our discussion will become, more openly, arguments about value judgements . . . . (Underscoring supplied.)[28]

In the United States, the "hippies" who want to "turn on, tune in, and drop out," the "yippies" who seem to prefer anarchy to the kind of rationalized social chaos they perceive, the campus malcontents, and the considerable number of those "over 30" oldsters who seem, in some measure, to share such views: all bespeak an extreme manifestation of what the respected motivational psychologist Ernest Dichter discerned many years ago: that the "Mr. Jones" who typifies urban American society has himself been undergoing profound change.[29] In substance, we seem increasingly to be, in Riesman's nomenclature, "inner directed" rather than "other directed." This represents a profound change in value sets and action priorities from that which prevailed only that rather short time ago when William F. Whyte discovered the "organization man." It is exemplified in the United States, of course, by Detroit's finally having to take cognizance of the increasing incursions of the VW "beatle" and now the Toyota into the domestic U.S. automobile market. Similar trends are currently evident in other consumption propensities.

In the early part of this decade I suggested that such value shifts, in conjunction with the emergent impacts of organizational cybernetics, would provide a new basis for consanguinity among the nations of man.

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28 Anthony Wedgwood Benn, "Living with Technological Change," New Statesman, 12 December, 1968, p. 827.

29 "Discovering the 'Inner Jones'," Harvard Business Review, May/June, 1965. p. 6 ff.

The substance of the chain of argument was expressed as follows:

> Scientific management was an early attempt to rationalize the management function. Now digital computers, epitomizing the new information technology, bid fair to automate the office as well as the factory. Cybernetic management, utilizing the information technology, evolves optimal logico-deductive patterns of industrial organization and procedure. As these technological imperatives impinge, nations will converge in terms of socio-industrial authority structures and behavioral modes. It seems most likely that there will be a universal tendency toward pluralistic industrialism.[30]

If or to the extent that such tendencies eventuate in the coming decade or two, we shall perhaps witness a general trend away from the "entrepreneurial ethic" to that which has been called "scientific humanism," having the following characteristics:

1) More effort will be organized around the problem to be solved, rather than around traditional functions such as production, marketing, etc.,

2) The leadership role will rotate within each mission or project, based on the nature of the problem and the sequence of knowledge required at various stages of its solution; and

3) Participation in the management process will become more widely distributed among all levels of the organization.[31]

Thus, "the frantic search for individualism in a society that increasingly demands interdependence from its members . . . (will create pressures) for production systems that are built around human needs rather than around conventional concepts of efficiency."[32] Warren Bennis' predictions

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30 "Toward a Universally Viable Philosophy of Management," Management Science, May, 1962, p. 47-8.

31 E.J. Korprowski, "New Dimensions for Decision-Making," Management of Personnel Quarterly, Winter, 1968.

32 Idem.

of the "coming death of bureaucracy" gain credibility when viewed in terms of the emerging organizational cybernetics.

So both from the standpoint of their likely impacts upon organizational structures and processes, and from their projected potentials in creating new organizational environments, the trinity comprising 1) general systems concepts, 2) information theory and the associated cybernetic science, and 3) computer technology may prove holy or otherwise, depending upon man's implementing value priorities. "Who controls the controllers, and how?" is the question which assumes greater urgency now that the apparition which George Orwell conjured in 1949 looms as an ominous potential only fifteen years hence. We conclude here as Boguslaw did in the final paragraph of his trenchant work:

> Our own utopian renaissance receives its impetus from a desire to extend the mastery of man over nature. Its greatest vigor stems from a dissatisfaction with the limitations of man's existing control over his physical environment. Its greatest threat consists precisely in its potential as a means for extending the control of man over man.[33]

And while we are mindful of Ferkiss' warning that:

> Man's destiny lies in continuing to exploit this "openness," rather than entering into a symbiotic relationship with the inorganic machine that, while it might bring immediate increments of power, would inhibit his development by chaining him to a system of lesser potentialities . . . . Man must stand above his physical technologies if he is to avoid their becoming his shell and the principle of their organization his anthill.[34]

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33 Op.cit., p. 204.

34 Op.cit., p. 255.

we share McHale's view that:

> The future of cultural forms already has many more dimensions of rich diversity. The promise within the newer media is of a greater interpenetration and interaction of life-art-culture rather than the forms-objects-images that preserved and isolated social life.
>
> As for the larger communication and understanding implied in a shared planetary culture, it is more than obvious today that we must understand and cooperate on a truly global scale, or we perish.[35]

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35 Op.cit., p. 300